# Journal of the American Society of Professional Graphologists

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# THE JOURNAL OF THE AMERICAN SOCIETY OF PROFESSIONAL GRAPHOLOGISTS

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Marc J. Seifer, Ph.D., Box 32, Kingston, RI 02881

## SUBSCRIPTIONS & GENERAL INFORMATION

Peggy Kahn, 4 Wayfaring Road, Norwark, CT 06850

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# MEASURING HANDWRITING TO IDENTIFY THINKING AND BEHAVIORAL STYLES IN FOUR QUADRANTS OF THE BRAIN

***Jeanette Farmer***

**ABSTRACT: Thinking styles and emotional styles in four quadrants of the brain could be identified through use of the Graphological Psychogram. The quadrants were the left and right cerebral and the left and right limbic. Results were significant for all but the right cerebral region. The Herrmann Brain Dominance Instrument, a forced choice, self–assessment questionnaire, that identifies four thinking styles, was the control instrument. These cognitive styles were correlated with the characteristics of handwriting movement found in Pophal's four "bio–types" of cortex, striatum, global pallidus and brain stem writers. Statistical evaluation revealed that measuring the psycho–motor impulses in handwriting could not only identify the left and right hemisphere characteristics, but also conscious and unconscious factors.**

## I. BRAIN DOMINANCE

Extensive physiological research has demonstrated the two hemispheres of the brain emphasize different specialized functioning (Sperry, 1970, McLean, 1973). This so-called "lateralization" can be measured neurologically as different brain wave patterns for each hemisphere, and it can also be measured in observable behavior. The Herrmann Brain Dominance Instrument (HBDI), a scientifically–designed and validated pen and pencil survey, uses forced choice/paired adjectives, handedness and occupational descriptors to identify four distinct thinking and emotional styles loosely linked to the four Jungian types: **A** - THINKING (Left Cerebral); **B** - SENSING (Left Limbic); **C** - EMOTIONAL (Right Limbic); and **D** - INTUITIVE - (Right Cerebral).

Constructs underlying Herrmann's four–quadrant theory are also built upon concepts drawn from biofeedback, Triune Brain theory and split–brain research, although they do not refer to actual locations or structures in the brain.

They are theoretical constructs metaphorically representing cerebral (conscious) and limbic (emotional) areas of the brain, which Herrmann defined as **A** and **D** (conscious) and **B** and **C** (emotional) quadrants. These four quadrants in turn are polemically related, (i.e., preferred or avoided) whereby **A** (THINKING) opposes **C** (EMOTION) and **B** (SENSING) opposes **D** (INTUITION). Each quadrant has multiple attributes. Thus, on the **B**-**D** polarity, Herrmann, prefers to represent **B** as "safekeeping" and this opposes **D**, "experimental," i.e., adventurous. For example, Figure 1, Herrmann's quadrant **A** (upper-left cerebral), the logical, analyzer, problem solving type, is stressed whereas quadrant **C** (lower right limbic) associated with interpersonal, emotional, spiritual qualities is not stressed, i.e., avoided.

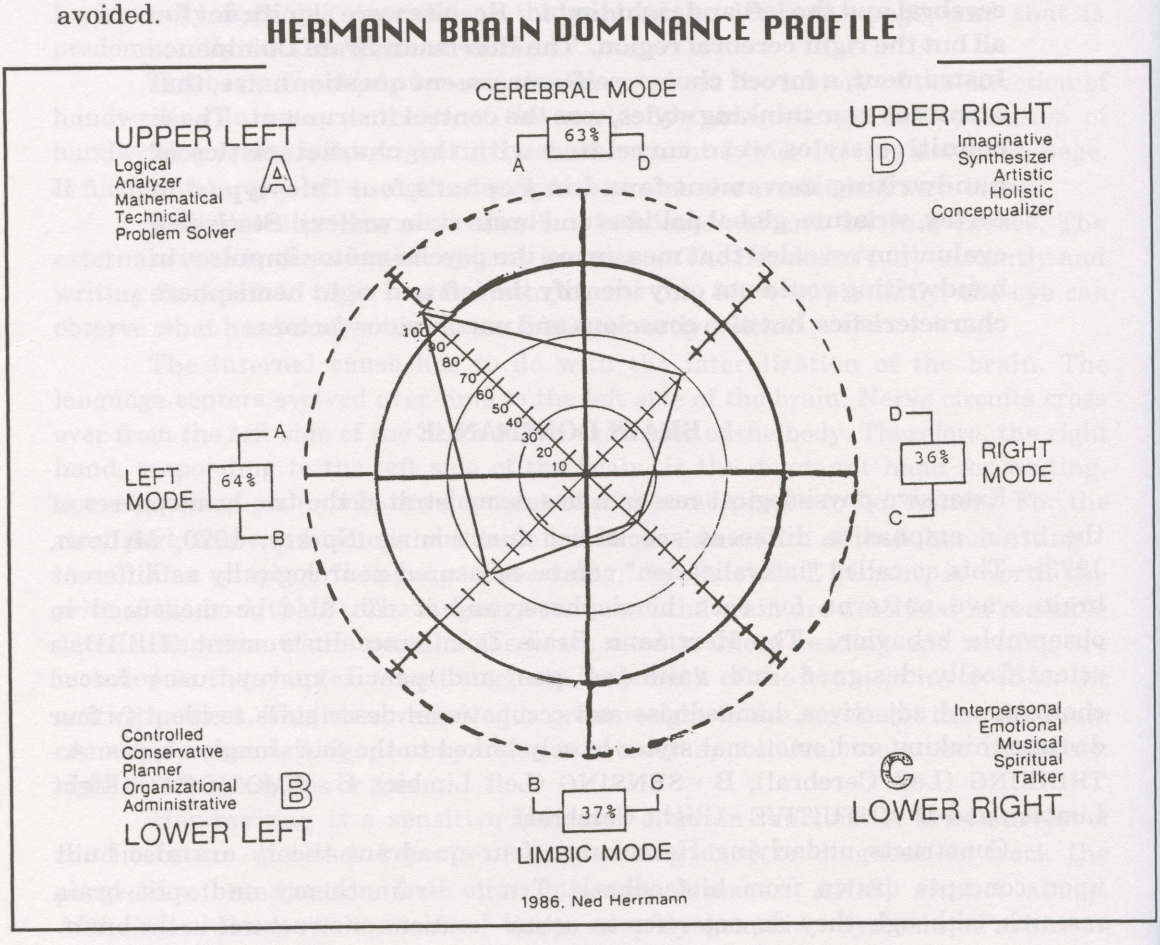

**Figure 1. Brad, age 21.**

The Herrmann Brain Dominance Instrument has evolved over 20 years and has been administered to over a one million individuals around the world. Validated studies conducted by WICAT, Inc. (Orem, Utah), the University of Texas at Arlington and by Applied Creative Services, Ltd., have established the HBDI as an accurate and reliable instrument. Several internal and external construct validity studies were constructed. Internal construct validation studies indicated which kinds of mental processes cluster together, (e.g., logical and mathematical). External construct validity indicates the HBDI I/E (introversion/extroversion) score has been correlated to the Myers–Briggs Type score and is highly related, (Herrmann, p. 350). It is supported by several dozen dissertations including a 1987 internal construct validity study by Kevin Ho for his doctorate at Brigham Young University. This involved 7989 subjects that used the quadrant scores for occupational profiling replicating an earlier study and indicated construct validity of the four clusters of brain dominance ( p. 352). Five factor solution found three factors strongly bi–polar (p. 370) which validated previous studies.

## II. RELATIONSHIPS OF HANDWRITING BEHAVIORS TO BRAIN FUNCTIONS

European studies related to the physiological basis of handwriting patterns have a long history. Notable researchers such as German neurophysiologist/ graphologist Rudolph Pophal and Hungarian psychologist/graphologist Klara Roman conducted approximately 75 collective years of research in the physiology of handwriting. Only small portions of Pophal's major work, *Handwriting–Brainwriting,* have been translated into English.

Pophal's (1949, 1958) studies in muscular tonus established handwriting's physiological/psychological link in the brain. He observed that the fundamental nature of the major motor centers decisively influenced the regularity or irregularity of the movement style. These brain areas – the pallidus, the striatum and the cerebral cortex -- derived from phylogenetically different developmental stages. He determined that movement as a pure product of the deepest strata of the brain carried handwriting's emotional, or unconscious, component. The movement style is directly related and induced by the fundamental nature of the major motor centers. Contracted movement exhibits disciplined self–control and/or emotional inhibition. Highly released movement is a primary indication of emotional dynamics and drive.

Pophal classified four personality typologies, or "bio–types", on the basis of essential differences in types of motor behavior. These were associated with movement patterns (Roman, p. 177) and corresponding specific motor centers:

| **Area of the Brain** | **Movement Patterns** |
|---|---|
| Cortex: | Mechanical, regulated, aimed movement |
| Corpus Striatum: | Rigidly controlled, regulated movement |
| Global Pallidus: | Abundant, irregular and driven movement |
| Brainstem: | Rhythmic, unpretentious, lively movement |

Pophal also established five degrees of tension in handwriting (1949) and by microscopic examination identified three different types of stroke quality that carry basic personality and health information for each type (Bernard, 1985, Backman, 1975, Karohs, 1985).*

Klara Roman conducted 24 research projects in the physiology of handwriting over 40 years, much of it for the Hungarian government. Using the pneumatic graphodyne, she measured neuromuscular tension patterns in the production of handwriting. She conducted an 8 year study of 2,300 children as they proceeded through the maturational process. She also studied handwriting and speech, and tension and release patterns in handwritings of rheumatoid arthritics. After immigrating to America in the late 1940s, Roman developed a two-semester accredited graphology training course at the New School for Social Research in New York City in the 1950s. She designed the Roman/Stamepfli Psychogram, a complex technical instrument, which she introduced in this country in 1956. This method formed the basis for this study.

Roman states that it is common knowledge that the neuromuscular tonus is affected by, and in turn affects, personality and behavior patterns. Tension in contracted or released movement is a bi–polar physiological concept, based on retained or released tension which influences the expenditure of energy (pp. 483-485).

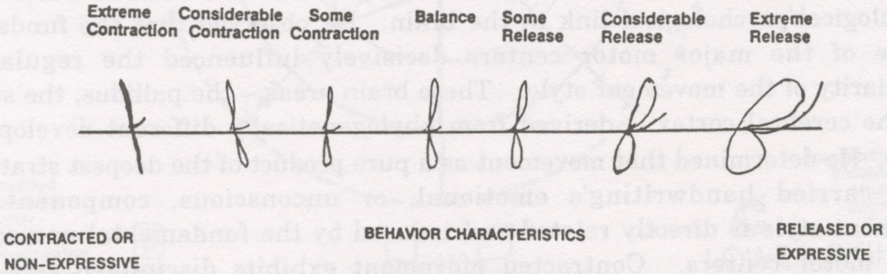

**Figure 2. Emotional Contraction or Release as a Continuum of Expressive Behavior as seen in handwriting characteristics.**

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* For refutation of Pophal's work on stroke quality and personality type, see A. Levine, Physical Aspects of Stroke Texture, ASPG, 3, pp. 81-91.

Motor impulses activate and govern the milli–second, antagonistic interaction of the sense organs (afferent fibers from the environment to the brain), and muscle sets (efferent fibers from the brain to the environment) that create movement patterns in up or down, left or right direction. Each carries inherently different tension levels. Flexor muscles control downward and leftward movement which contain more retained tension. Upward and rightward movement controlled by the extensor muscles features a milli–second release of tension. Psychodynamic theory interprets contracted or released movement as a reflection of inhibition or discipline versus expressive responses to emotional sensations. Contracted or expansive movement style contains the psychological implications that motivates expressive behavior as seen on paper. Handwriting identifies the physical, mental and emotional state of the writer at the time of writing.

Other experts who studied the physiological and psychological link to handwriting's movement in the brain include American graphologists Thea Stein–Lewinson and psychologist Joseph Zubin (Lewinson, 1942). These authors evaluated 22 factors on a seven point scale with reference to a mid–point of "rhythmic balance" to define tension contraction or release tendencies on the writings of 5 non–delinquents and 15 delinquent subjects. Their study found less deviation from the central point of the scale in the handwriting of non–delinquent subjects.

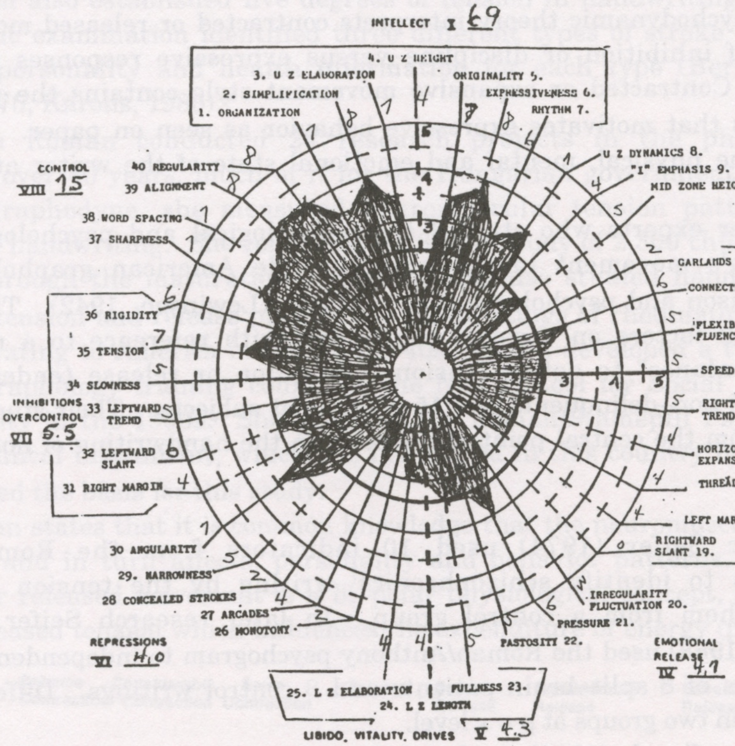
Marc Seifer (1974) used 10 indicators from the Roman/Anthony Psychogram to identify schizophrenics' writing by the tension factors that separated them from a control group. In later research Seifer, Siegel and Tenhouten (1988) used the Roman/Anthony psychogram to independently score the handwritings of 8 split–brain patients and 8 control writings. Differences were found between two groups at p = x level.

Choen Sarah (1988) analyzed 24 children's writings for 17 personality characteristics, four of which were scored for hyperactivity. Profiles obtained by graphological analysis matched the appropriate clinical profiles to a statistically significant degree. Graphologists were able to distinguish the handwritings of normal and those with a diagnosis of hyperactivity. They were able to differentiate between the specific syndromes of hyperactivity and retardation (pp. 229).

The Roman–Staempfli Psychogram used to evaluate the handwritings in this study is a circular configuration with 40 handwriting indicators arranged as spokes around a wheel. Clusters of related indicators are grouped in major dimensions of personality as follows:

I. Intellect
II. Ego
III. World Directedness
IV. Emotional Release
V. Libido, Vitality & Drives,
VI. Repressions
VII. Inhibitions/Overcontrol
VIII. Control.

**Figure 3: The Graphological Psychogram of Brad, 21, right handed.**



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Roman called it a "pictorially rendered profile in a circle of the writer's personality projected as a dynamic whole" (1968, p. 519). Based on 35 years of research, Roman designed it to provide an objective synthesis with which to evaluate the size, quantity, emphasis or frequency of graphic indicators. She based its organizational design on the strength of the contracting or releasing influence in various aspects of the movement, form and spacing. It is a graphic expression of the individual's energy flow as measured by the physiology of the movement style. The movement style carries different tension factors and defines characteristics along a continuum that portrays emotional contraction or release. Indicators are measured objectively scored on a scale of 1–5 with the range from little or no expression (0 or 1) to over expression (4 or 5) with 2.5 average. (Unlike the Roman/Anthony Psychogram which uses a 10–point scale, this uses a 5-point scale). Indicators correlate with personality characteristics and are related to major dimensions of personality.

Measurements are plotted on a standard form to provide a "graphic map" or mandala of the personality (1968, pp 515–524). Directional weight of the mass (or quadrant stressed) is central to interpretation. No dimension is significant on its own as it is inseparable from the whole. The left half of the Psychogram represents contraction (introversion) and the right half represents release (extroversion). Dividing the circle across the middle, the top half are mental (conscious) factors while the bottom half represents biologically rooted, unconscious factors.

## HYPOTHESIS

This study was designed to test the hypothesis that handwriting's psycho–motor impulses demonstrate the strength and intensity of the brain's four thinking and emotional styles as measured by the Graphological Psychogram. The styles were defined by the Herrmann Brain Dominance Instrument (HBDI).

## METHOD

Herrmann created a brain dominance chart in the form of a mandala which segmented four distinct quadrants and four corresponding personality types:

| | |
|---|---|
| **A** - Left Cerebral **(LC)** | **D** - Right Cerebral **(RC)** |
| **B** - Left Limbic **(LL)** | **C** - Right Limbic **(RL)** |

In order to compare the Psychogram scores to the HDBI, the author created a Graphological Brain Dominance chart which utilized the same four quadrants, placing various graphological indicators that corresponded to personality types in each respective quadrant. Each chart (Graphological Brain Dominance Chart and HDBI chart) were independently scored and then the two charts were compared.

Seventeen males (ages 22–72) and 30 females (ages 22–70), 2 left handed and 45 right handed, participated in this study. Participants were asked to produce 1 1/2 to 2 pages of spontaneous handwriting (not copied or dictated) in the printing or cursive style favored, on a random topic on 8 1/2 x 11 unlined paper. Their sample included all capital letters and numbers from 1–10. Two graphologists certified by the American Handwriting Analysis Foundation and trained in the Graphological Psychogram scored the handwritings. The HBDI was distributed when participants submitted a handwriting sample. Participants mailed the HBDI to Herrmann for scoring. Herrmann retained HBDI results until handwriting measures had been completed.

To define dominance for the quadrants, it was necessary to align Herrmann's four thinking style characteristics with Pophal's behavioral "bio–types" topologies of personality so variables could be defined. Using Pophal's behavioral descriptors, they were aligned as follows:

**Cortex** writer aligned with the Left Cerebral -- **LC**
**Striatum** writer aligned with the Left Limbic -- **LL**
**Global Pallidus** writer aligned with the Right Cerebral -- **RC**
**Brainstem** writer aligned with the Right Limbic -- **RL**

The author assigned specific Psychogram indicators and a select number of Pophal's variables to define each quadrant's dominance. To incorporate Pophal's specific movement characteristics which were not Psychogram indicators, his variables were assigned to the quadrants based on its average or above average influence in contributing to a specific thinking or behavioral style. The Left Cerebral, the Right Cerebral and the Left Limbic quadrants each had 22 variables and the Right Limbic had 23 for a total of 89 variables.

In order to utilize a 10 point scale, Psychogram indicator scores were doubled. (See Table I) If a doubled score was stressed, (numerically, if it achieved a score of more than 5), it was assigned to a particular quadrant. A few specific graphological factors, such as "i" dots or simplified lower zone (LZ), not scored by the Psychogram but deemed as possibly influencing quadrant dominance were included in the appropriate quadrant.

In the second phase of scoring, quadrant emphasis was determined by an "either/or" method. Either the quadrant was emphasized or it wasn't. This was achieved by calculating extreme scores of 7 or more as a total indicator of the quadrant thus, these scores were weighted as a 10.

In addition to the correlation analysis of the quadrants, Principle Components Analysis using the Statistical Package for Social Sciences (SPSS) software was completed for a test of internal consistency of the variables. This factor analysis tested each variable against each and every variable in each quadrant — an inter–hemisphere, intra–hemisphere and diagonally opposed quadrant check.

## Scoring Chart of Handwriting Variables for the Four Quadrants

Name _____________ Age __ Sex __ LH/RH __ hooked __ not hooked

**LEFT CEREBRAL TOTAL _____**

__ regularity
__ simplification
__ sharpness
__ right slant (score in reverse)
__ angularity
__ uniform connections
__ left slant
__ alignment
__ MZH (score in reverse)
__ wide line spacing
__ firm disconnected script
__ regular, mechanical beat
__ blunt endings
__ connectedness
__ accurate i-dots, precise t-bars
__ linear cursive
__ tension
__ narrow or retraced

**LEFT LIMBIC TOTAL _____**

__ narrow MZ
__ narrow LZ
__ restricted LZ length
__ connectedness
__ regularity
__ organization
__ alignment
__ arcades
__ right slant (score in reverse)
__ left slant
__ left trend
__ simplification
__ retracing
__ monotony; inhibited
__ slowness
__ space between words
__ displaced pressure
__ rigidity
__ tense
__ wide right margin

**RIGHT LIMBIC TOTAL _____**

__ dynamic, fluid, stormy movement
__ irregularity
__ horizontal expansion, right trend
__ enriched forms (e.g., Greek e's)
__ LZ fullness
__ rising lines
__ broad left margin
__ LZ length
__ thready, air strokes
__ connectedness w/fluidity
__ close, dense tangled lines
__ originality
__ illegibility or disintegrating forms
__ Pressure
__ UZ elaboration
__ pastosity
__ simplified caps
__ small right margin w/speed

**RIGHT LIMBIC TOTAL _____**

__ right trend
__ horizontal expansion
__ low pressure (score in reverse)
__ elaborated middle zone
__ garlands
__ fullness
__ pastosity
__ right slant
__ close or tangled lines
__ soft, rounded forms
__ simple, unpretentious forms
__ word spacing (score in reverse)
__ LZ elaboration
__ fluidity
__ regular, balanced, rhythmic
__ diminuendo
__ expressive
__ connectedness
__ left-tending UZ as in looped d's
__ small left margin

## RESULTS

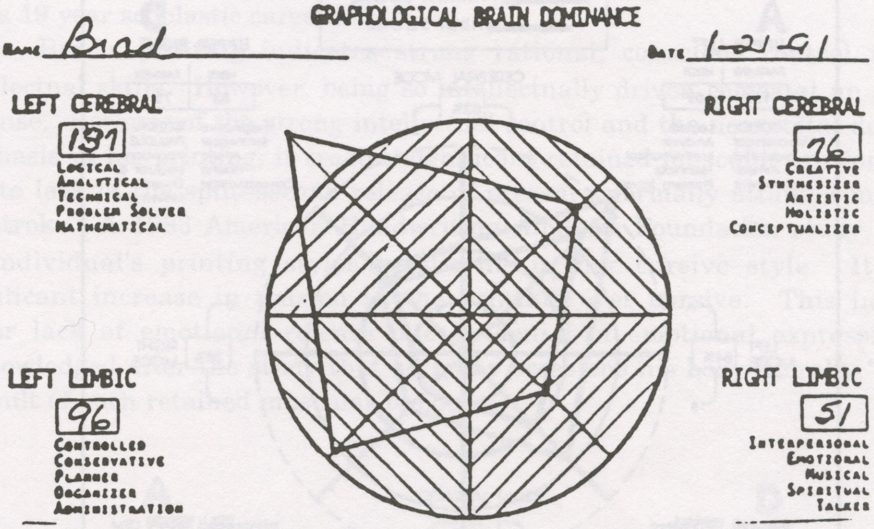
Three of the four quadrants were statistically significant:

**A** – Left cerebral (LC) .356 – < .05 **D** – Right cerebral (RC) .128 – n.s.
**B** – Left limbic (LL) .400 – < .01 **C** – Right limbic (RL) .388 – <.01

This supported the hypothesis that the graphological chart and the HBDI chart correctly measured quadrant brain dominance. However, varied quadrant significance merits further discussion. LC was not as significant as the RL and LL. This can be attributed in part to differences in scoring procedures that produced the raw scores. For instance, as mentioned before, the HBDI scored for gender and handedness which was not incorporated into the handwriting profiles.

The author recognized in the pilot study that significant scoring procedure differences existed between the methods. It was hypothesized that the LC quadrant would carry the greatest variance because the HBDI assesses preference by self–assessment whereas measuring handwriting tends to identify latent potential and unconscious factors. When the HBDI identified a strong right brain thinking preference in pre–research samples, it also registered a very low intellectual "avoidance" raw score for the left cerebral. This meant that the individual preferred to avoid situations that required the LC mental processes, not that they were incapable of utilizing them. In 41 of 47 handwriting profiles, LC scores were consistently larger, at times double, even triple in some cases, than the corresponding HBDI LC self–assessment based raw scores. Raw scores for both profiles are seen in the box under the A, B, C, D quadrants. The handwriting profiles' raw score summation seen in the boxes on the graphological dominance chart were used to plot the graph. Visually comparing the profiles' pictorial emphasis shows consistently stronger portrayal of intellectual capacity in the LC quadrants of the handwriting profiles as compared to the HBDI. This affected the number of four quadrant matches attained because of very low "avoidance" left cerebral HBDI score given when RC mental processes were preferred. Consequently, only nine four–quadrant matches, 2 males and 7 females, with the same hierarchy of quadrants occurred (significant at <.05).

## CONGRUENT PROFILES



GRAPHOLOGICAL BRAIN DOMINANCE

NAME Brad

DATE 1-21-91

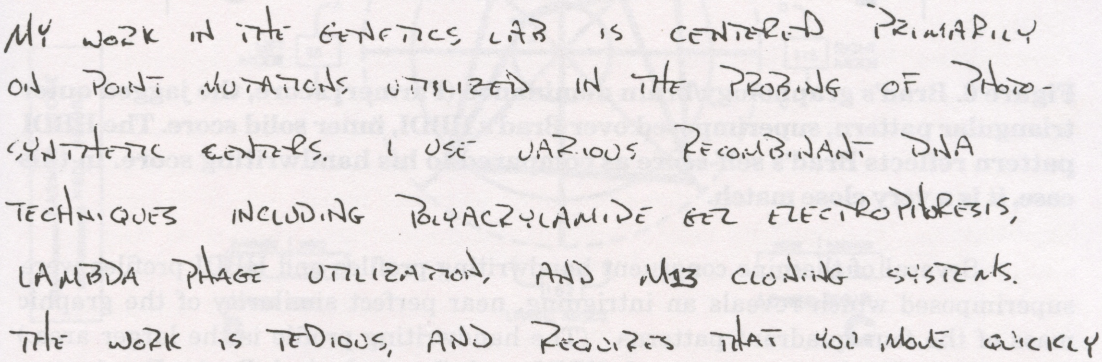
LEFT CEREBRAL
131
LOGICAL
ANALYTICAL
TECHNICAL
PROBLEM SOLVER
MATHEMATICAL

RIGHT CEREBRAL
76
CREATIVE
SYNTHESIZER
ARTISTIC
HOLISTIC
CONCEPTUALIZER

LEFT LIMBIC
96
CONTROLLED
CONSERVATIVE
PLANNER
ORGANIZER
ADMINISTRATION

RIGHT LIMBIC
51
INTERPERSONAL
EMOTIONAL
MUSICAL
SPIRITUAL
TALKER

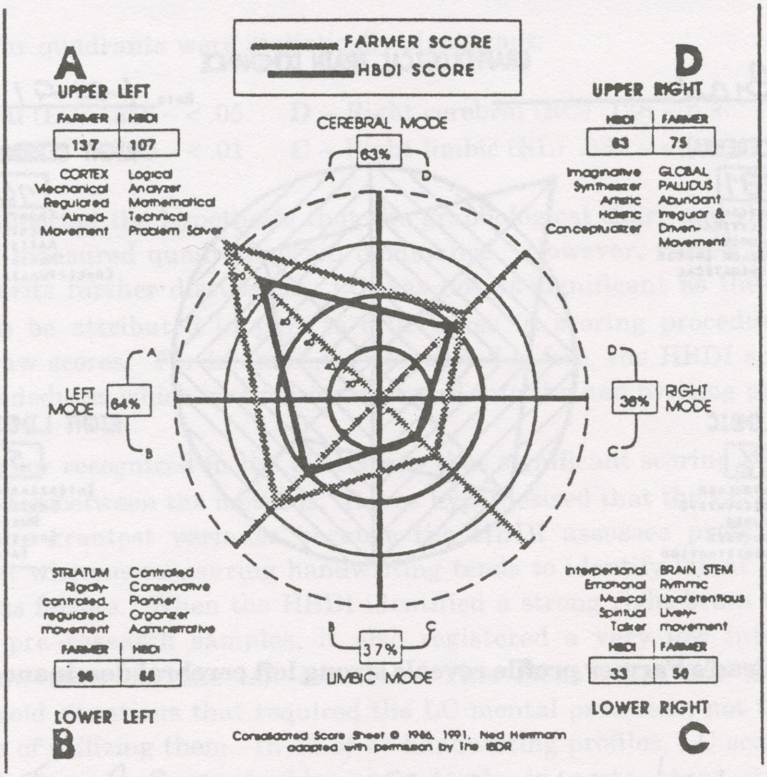
**Figure 4: Brad's Farmer profile reveals strong left cerebral dominance.**



MY WORK IN THE GENETICS LAB IS CENTERED PRIMARILY
ON POINT MUTATIONS UTILIZED IN THE PROBING OF PHOTO-
SYNTHETIC CENTERS. I USE VARIOUS RECOMBINANT DNA
TECHNIQUES INCLUDING POLYACRYLAMIDE GEL ELECTROPHORESIS,
LAMBDA PHAGE UTILIZATION, AND M13 CLONING SYSTEMS.
THE WORK IS TEDIOUS, AND REQUIRES THAT YOU MOVE QUICKLY

**Figure 5: Brad's printing: mostly all down strokes, very directed, highly regular and controlled with regular forms and spacing, a near perfect example of Pophal's "cortex" writer.**

## HBDI & Graphological Profile Score Comparison



Consolidated Score Sheet © 1986, 1991. Ned Herrmann adapted with permission by the IBDR

**Figure 6. Brad's graphology/brain dominance (Farmer) score, the jagged outer triangular pattern, superimposed over Brad's HBDI, inner solid score. The HBDI pattern reflects Brad's self-score as compared to his handwriting score. In this case, it is a very close match.**

Several of the nine congruent handwriting profiles and HBDI profiles were superimposed which reveals an intriguing, near perfect similarity of the graphic mass of the four quadrant patterns. (The handwriting profile is the larger area.) Figure 4 is Brad's superimposed HBDI and Graphological Brain Dominance Profile, a near–perfect four quadrant match with its strong upper–left emphasis. Compare this with his Psychogram pattern, Figure 3, with its strong upper left directional emphasis. This quadrant is where major intellectual/control factors are measured and portray the strength of his intellectual capacity and orientation. Note in particular, the capital P's. This similarity is not so surprising when one realizes that the Psychogram is based to some extent in a pictorial sense on the actual graphic pattern it is measuring. (Post research note: Brad, currently in a biochemistry PhD. program, has consistently attained a 4.0 grade average for most of his 19 year scholastic career.)

Brad's printing indicates strong rational, conscious control and keen intellectual skills. However, being so intellectually driven comes at an emotional expense. Because of the strong intellectual control and the near–total downstroke emphasis in his printing, it creates significant retained muscular tension. This is due to lack of the split–second release of pressure normally attained in cursive's up–stroke. A 1983 American Handwriting Analysis Foundation study compared an individual's printing styles versus his or her cursive style. It found a significant increase in tension in the printing over cursive. This indicates a major lack of emotional release due to denial of emotional expression. Brad acknowledged after the study that on many occasions his body literally "hurts" as a result of such retained muscular tension.

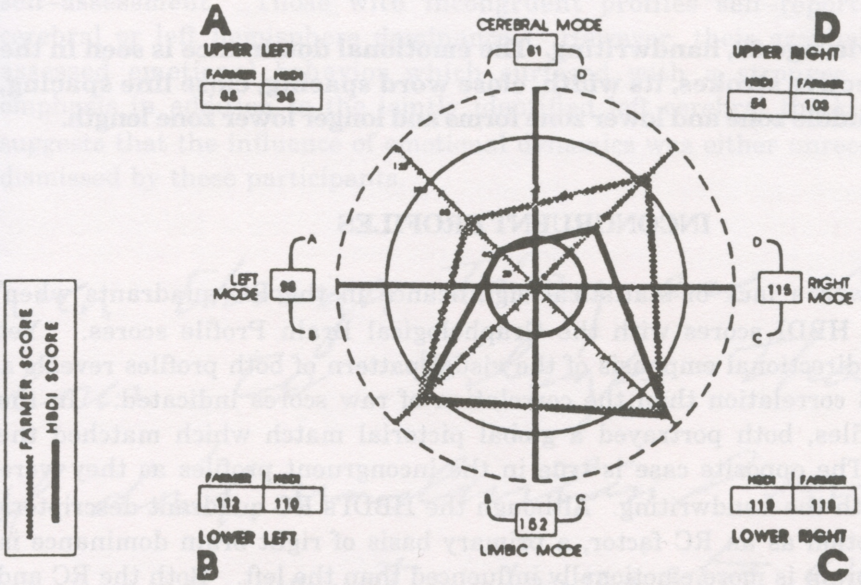
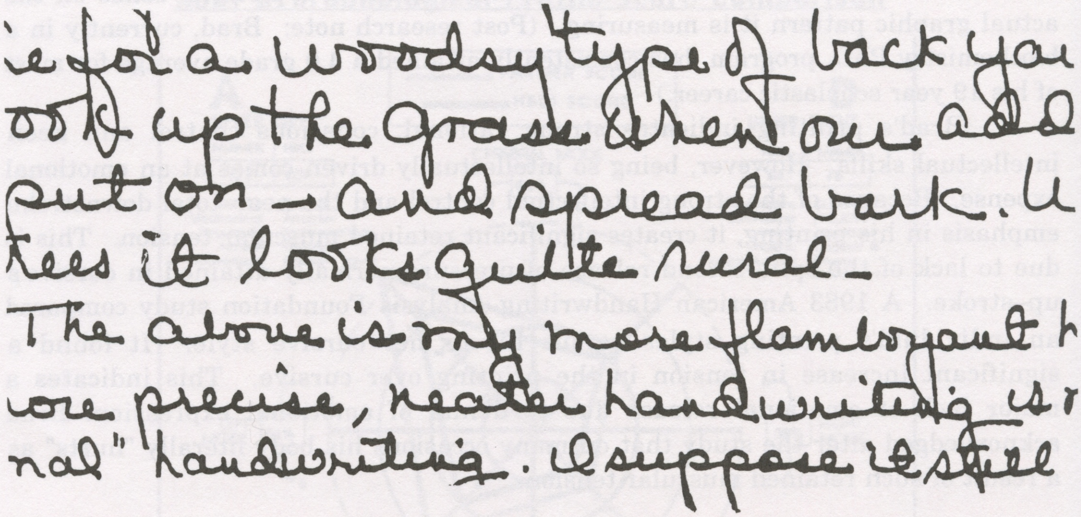


**Figure 7: Olivia, age 62, former teacher. Superimposed profiles reveals limbic dominance. Note the very similar graphic plot in the hierarchy–ordered four quadrant matches, i.e., C, B, D, A.**



e for a woodsy type of back ya
ook up the grass. Then we add
put on — and spread bark. U
trees it looks quite rural —
The above is my more flamboyant h
ore precise, neater handwriting is r
nal" handwriting. I suppose it's still

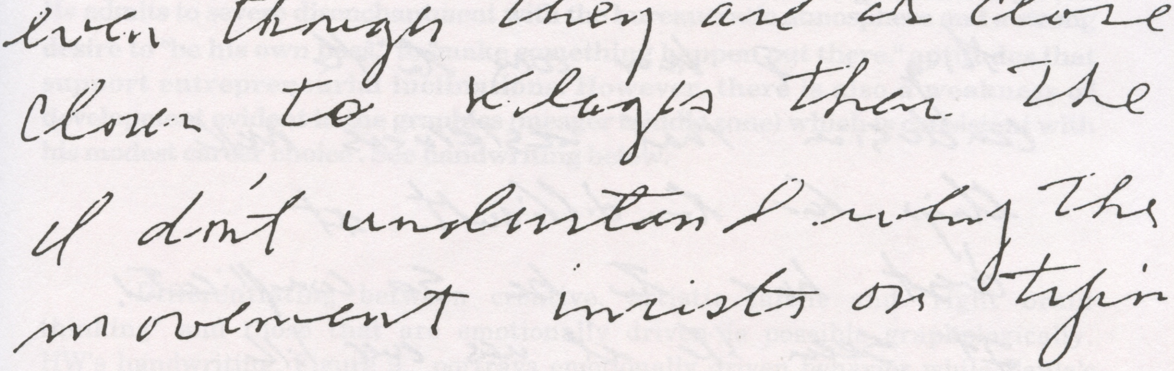
**Figure 8: Olivia, age 62, handwriting. The emotional dominance is seen in the garland connective strokes, its width, close word spacing, close line spacing, rounded, full middle zone and lower zone forms and longer lower zone length.**

## INCONGRUENT PROFILES

There was a lack of statistical significance in the RC quadrants when comparing the HBDI scores with the Graphological Brain Profile scores. Yet comparing the directional emphasis of the visual pattern of both profiles reveals a stronger visual correlation than the correlation of raw scores indicated. In the congruent profiles, both portrayed a global pictorial match which matched the handwriting. The opposite case is true in the incongruent profiles as they were incongruent with the handwriting. Although the HBDI's RC quadrant descriptors do not list emotion as an RC factor, a primary basis of right brain dominance is that the right brain is more emotionally influenced than the left. Both the RC and RL quadrants are emotionally influenced but correlate with a distinctly different movement style. While handwriting's content is consciously produced, its emotionally contracted or released movement pattern is unconsciously (emotionally) influenced. Pophal's criteria of dynamic, abundant, irregular movement is a primary indication of emotional drive. This need to freely experience emotional release, surfaces in expressive, emotionally driven behavior, and was slotted in as an RC variable. This factor surfaced strongly in the incongruent profiles.

Herrmann's data identifies creative, artistic, marketing talents, "what if'ing", speculative and futuristic thinking as a right cerebral cognitive style. Entrepreneurial and sales people emerge there, but Herrmann makes no distinction between the types. However, graphologically, the dynamics of emotional driven people can be differentiated from those driven by more cognitive and creative factors. Thus, two different movement styles, one cognitive and one more emotional, could be found in the RC graphological quadrant, but not found as readily in the RC HBDI. (Post research discussion with Herrmann revealed that the HBDI does not assess behaviors in the HBDI RC quadrant.)

Recognized pitfalls of self–assessment by participants' lack of self–knowledge or over–estimation also surfaced. While only 1 of the 30 females produced an incongruent profile, 7 of the 17 males (41%) produced mis–matched profiles. One male revealed strong artistic/creative potential unrecognized by self–assessment. Those with incongruent profiles self–reported strong left cerebral or left hemisphere dominance. However, their graphological profiles assessed emotional behavior which surfaced with a stronger right cerebral emphasis in addition to the jointly identified left cerebral thinking style. This suggests that the influence of emotional dynamics was either unrecognized, and or dismissed by these participants.



even though they are as close
closer to [illegible] than the
I don't understand why the
movement insists on tipin

**Figure 9: HW's handwriting features erratic, dynamic, angular, thrusting movement with strong pressure, a bouncy baseline, varying letter size and word spacing. It indicates emotionally charged behavior rather than creativity.**

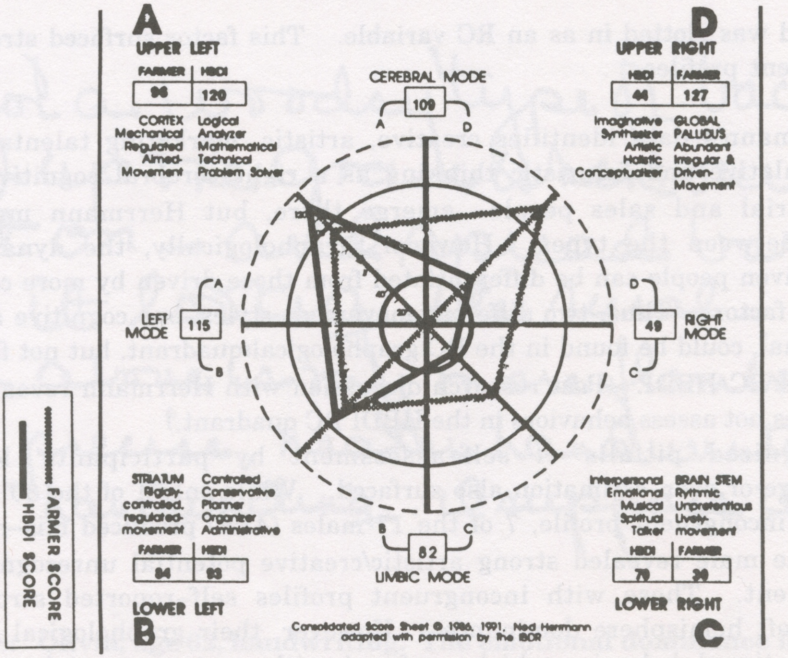


**Figure 10: HW, PhD. 72, right handed engineer. Superimposed handwriting/HBDI profile is incongruent. He identified himself as a strong left cerebral (LC) thinker and his handwriting profile pattern showed a completely different quadrant as dominant. In revealing the same strength of left cerebral thinking skills, it defined a stronger right cerebral (RC) emphasis due to his emotionally driven, dominating behavior.**

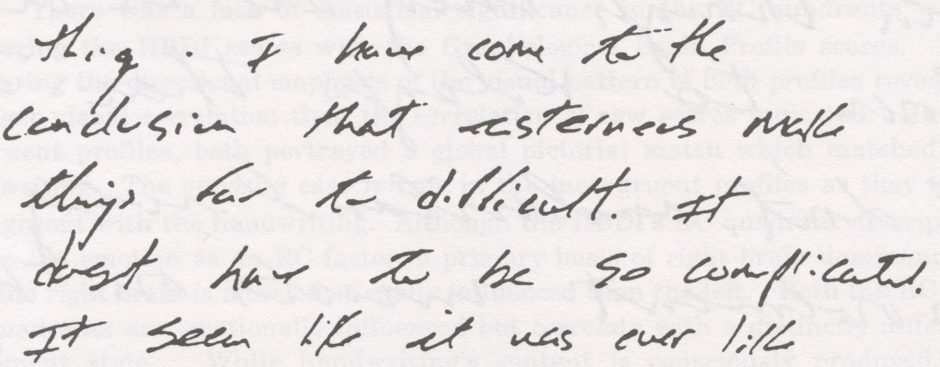

thing. I have come to the
conclusion that easterners make
things far to difficult. It
dosnt have to be so complicated.
It seem like it was ever like

**Figure 11: CF's handwriting. Irregularity in this writing indicates considerable emotional sensitivity (irregular slant and middle zone, lower zone length, bouncy baseline) coupled with an upper zone (conscious) emphasis and emotional drive that underscores an entrepreneurial spirit.**

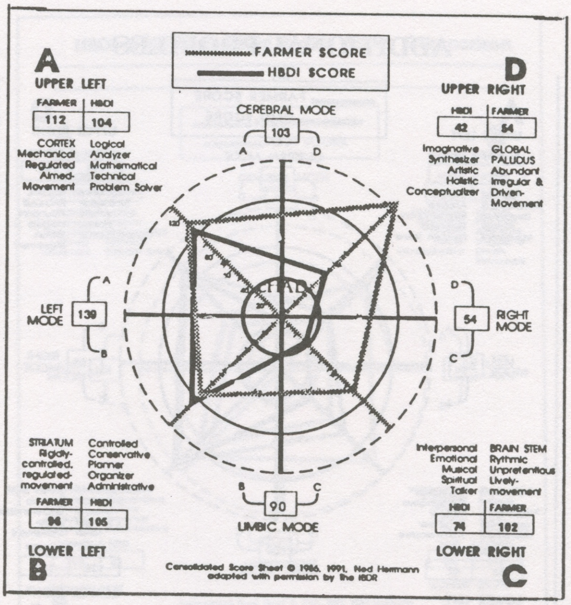


**Figure 12: CF, male, 22 yrs. This incongruent profile reveals that he self-assessed strong LC analytical thinking skills and LL controlled, planning organizational skills typical of a young bank examiner. On the other hand, the handwriting profile shows more emotional sensitivity than he was willing to admit/recognize. His writing reveals an intensity of emotional drive, blocked from cognitive awareness (seen as numerous arrhythmic breaks between letters.) He admits to severe disenchantment with the bureaucratic atmosphere and a strong desire to "be his own boss," to "make something happen out there," aptitudes that support entrepreneurial inclinations. However, there is also a weakness of development evident in the graphics (meager middle zone) which is consistent with his modest career choice . See handwriting below.**

Differentiating between creative, artistic talent and "right brain thinking" and those that are emotionally driven is possible graphologically. HW's handwriting, Figure 9, portrays emotionally driven behavior while Paula's very rhythmic handwriting, Figure 13, below, is a clear example of a creative, artistic, synthesizing, conceptualizing right brain thinking style.

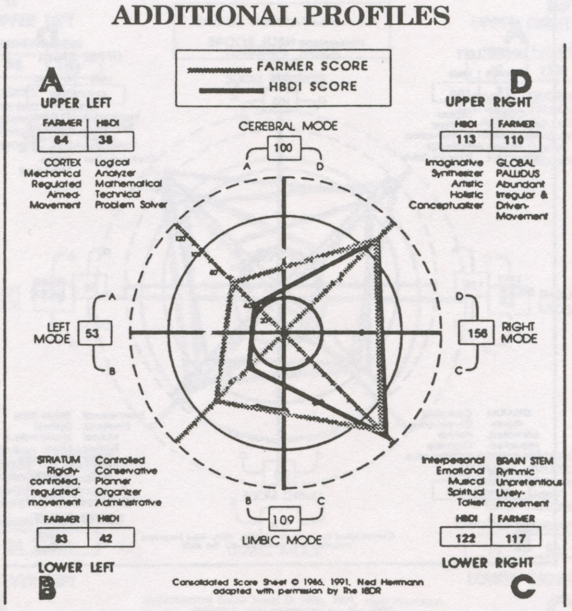


**Figure 13. Paula, RH, 29 yrs. Superimposed profiles show strong right brain dominance, and excellent congruence between her self HBDI and handwriting score.**

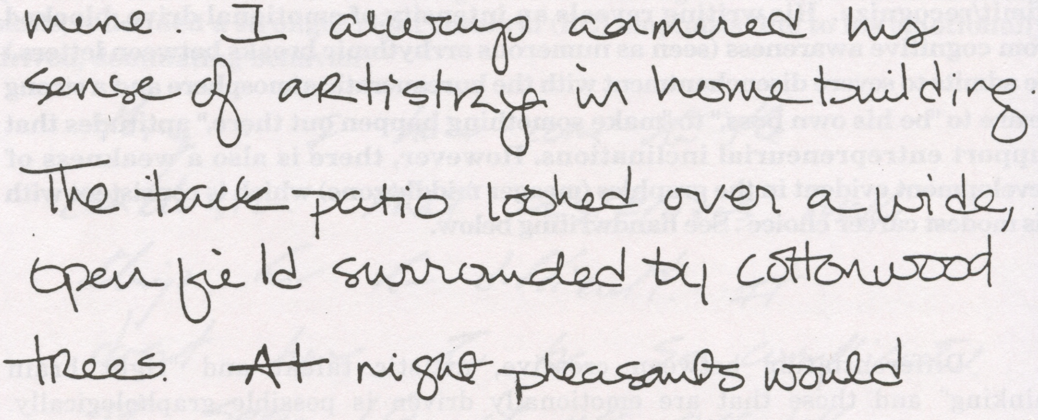

mere. I always admired his
sense of artistry in home building.
The back patio looked over a wide,
open field surrounded by cottonwood
trees. At night pheasants would

**Figure 14: Paula's handwriting reveals a highly rhythmic, facile, integrated fluidity of movement which carries her natural intuitive sense and multi–talented creative flair. It is a prime example of great flexibility which is indicative of enhanced inter–hemispheric communication processes.**

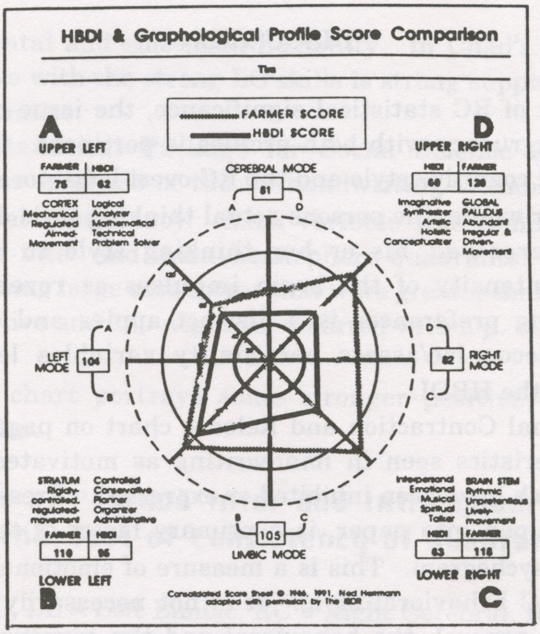
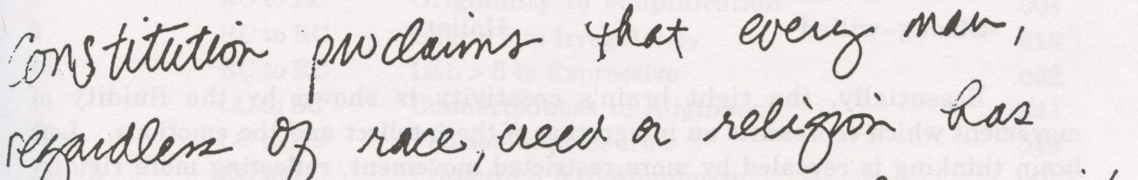


**Figure 15. Tim. Graphological profile identified unrecognized artistic, creative potential, (emphasis on RC quadrant), while he identified left brain dominance due to managerial duties. Handwriting features free, spontaneous, emotionally vibrant, rhythmic movement which reveals the artistic potential. When quizzed, he revealed he enjoyed drawing.**



Constitution proclaims that every man,
regardless of race, creed or religion has
ertain inalienable rights ~~to the pursuit~~
of 'Life, Liberty and the pursuit of Happiness.'

**Figure 16. Tim's handwriting.**

## DISCUSSION

Despite lack of RC statistical significance, the issue of the handwriting's congruency or incongruency with both profiles is pertinent. The primary issue is that the RC internal cognitive style and the RC overt behavioral/social style, are not comparable. In other words, the persons actual thinking style did not correlate with how the person *perceived* his or her thinking style to be. Measuring the organization and intensity of the brain impulses as revealed in handwriting versus self–reporting preferences is a distinct apples and oranges issue. The graphologist can recognize/assess personality variables left unrecognized by self–reporting or by the HBDI.

The Emotional Contraction and Release chart on page 4 provides a list of behavioral characteristics seen in handwriting as motivated by the demand of strong emotions which have been inhibited or expressed. Pressure, the result of the writer pressing the pen into paper, is a primary factor of the emotional release dimension on the Psychogram. This is a measure of emotional depth and provides the drive for the RC behavioral style. It is not necessarily a component of RC cognitive style. In general, the behavioral and the cognitive style of the Right Cerebral can be defined separately as follows:

| **BEHAVIORAL STYLE** | **HERRMANN'S COGNITIVE** |
|---|---|
| Outspoken/assertive | Creative |
| Impulsive | Conceptualizing |
| Dominating/tends to be pushy | Synthesizing |
| Action–oriented | Artistic |
| Strong–willed | Holistic |

Essentially, the right brain's creativity is shown by the fluidity of movement which represents an integration of the intellect and the emotions. Left brain thinking is revealed by more restricted movement, reflecting more rigidity of thinking and behavior. The August, 1991, *New Sense Bulletin* reported a study by Ingegerd Carlson of Lund University in Sweden. Carlson tested 84 undergraduate students and found that the highly creative people in the pool reacted flexibly and did not have rigid hemisphere–specific reactions. In short, they were less programmed (less rigidly wired) in calling up left hemisphere–specific defenses. HW's writing is a prime example of rigidity of thinking and a lack of rhythmic emotional integration while Paula's and Tim's writings are prime examples of an internalized rhythmic integration and flexibility in the free flowing movement. Dominance patterns that feature a more equalized balance indicates greater mental and emotional flexibility. In Chad's case, combining his strong emotional drive with the strong LC skills is strong support for him to see his RC ambitions materialize.

Using the Statistical Package for Social Science (SPSS) software, a Principal Components Analysis of the 89 handwriting variables was done. This was a test of internal consistency. Each variable was compared against every other variable in the inter and intra–hemisphere quadrants. This test produced 6,000 correlations. Using large case scores that were greater than 25, there were 405 correlations, 255 positive and 150 negative, occurred with a p. =<.05.

The following chart portrays some stronger positive correlations of the handwriting variables.

### Chart 1: Samples of Positive Inter and Intra-quadrant Correlations in SPSS Internal Test of Consistency of Quadrant Variables.

(LC = Left Cerebral, LL = Left Limbic, RC = Right Cerebral, RL = Right Limbic)

| | | | |
|---|---|---|---|
| 1. | LC to LC | Simplification to Word Spacing > than 5 | .006 |
| 2. | RC to RC | Pressure > 5 to irregularity | .001 |
| 3. | RC to RC | Flexibility to Originality | .014 |
| 4. | LC to LL | Rigidity to Angularity | .009 |
| 5. | RC to RC | Expressive to Driving movement | .015 |
| 6. | LC to LC | Connectedness to Simplification | .022 |
| 7. | LC to LL | Angularity to Tension | .004 |
| 8. | RC to LC | Originality to simplification | .004 |
| 9. | RC to RC | LZL > 5 to Irregularity | .018 |
| 10. | RC to RC | LZL > 5 to Expressive | .002 |
| 11. | LC to LC | Connectedness to Alignment | .034 |
| 12. | LC to RC | Tension to pressure > 5 | .046 |
| 13. | RC to LC | Pressure > 5 to Angularity | .001 |
| 14. | RL to RL | Soft rounded forms to moderate fullness | .032 |
| 15. | RL to RL | Triangular MZ to soft rounded forms | .024 |

**This chart depicts positive correlations of the graphological variables. See discussion of some of these below. (LZL = lower zone length; MZ = middle zone.)**

Several highly significant statistical correlations occurred that identified major handwriting variables in the intra–quadrant or inter–hemisphere comparison. As most variables are Psychogram indicators with a contracting or releasing influence, these supported the validity of the graphological premise of emotional contraction or emotional release as a principle factor of brain dominance. The left brain measures objective thinking and the right brain the subjectivity of emotion. This does not imply, however, that the 40 Psychogram indicators only have a single quadrant influence. As the Psychogram is a global personality profile, several indicators may be influential in more than one quadrant. It is the predominant influence of major factors that contributes to quadrant dominance that is significant.

**Variable # 1:** LC variable of simplification indicates a correlation at .006 to LC variable, word spacing (spacing between words). These are major LC intra–quadrant variables. This supports Freud's concept of sublimation of emotions as a factor in strong rational, mental control (mental discipline and/or emotional inhibition). Simplification and word spacing are major conscious thinking indicators in the Control dimension, upper left quadrant of the Psychogram. Statistically, these factors played a major role in defining dominance in the Herrmann left cerebral quadrant. Simplification, as a measure of clean, efficient, streamlined thinking, is scored by how the writer simplifies the writing, (e.g., the ability to discard non–essentials strokes taught in the copybook model). Wider word spacing reveals the need for clarity and objectivity of the thinking processes and/or the need for emotional distance.

**Variable # 2:** RC variable of pressure (depth into the writing page) greater than 5 and RC variable of Irregularity correlated at .001. Both are indicators in the Emotional Release dimension of the Psychogram. This intra–quadrant correlation strongly supports the graphological interpretation that emotional intensity and depth is seen in heavy pressured writing. Irregularity of the movement signifies stronger emotional strength and drive. This is a primary component of the entrepreneurial/sales capacities as well as the creative influences.

**Variable # 3:** RC variable of Flexibility to RC variable of Originality (cognitive/emotional drive to be individualistic) is strongly correlated at .014. Flexibility is indicative of a willingness and propensity to adapt, to mentally bend and flex, which is a recognized right brain function.

**Variable # 4:** LC variable Rigidity to LL variable Angularity are both constricting/contracting factors (on left side of the Psychogram) which correlate at .009. Strong angularity contributes to a stronger score for Rigidity, a Psychogram indicator.

**Variable # 15:** RL variable triangular middle zone to RL soft rounded forms correlated at .024. Triangulation of the middle zone is reflecting in the handwriting when the letters decrease in size as it moves to the right. This is deemed as diplomacy in approaching people and the world. The soft rounded forms portray a gentle demeanor. These factors contribute to the interpersonal skills that are integral to the primary influence of the Right Limbic quadrant.

The strongest support for the hypothesis that emotional contraction, or suppression of affect, versus emotional release in handwriting's movement is the central factor in brain dominance is found in the negative correlations. Further, specific handwriting factors seen in contracted movement denote the influence of intellectual control or inhibition of emotion for left brain objectivity. Conversely, released movement indicates the energized flow of emotions as a primary indicator of emotional drive in right brain dominance. Essentially, regularity of movement portrays objective thinking versus the irregularity of movement which portrays subjective influences that direct behavior. Examples of negative correlations of variables in opposing quadrants are seen below:

## Chart 2: Samples of Negative Correlations in Internal Test of Consistency of Variables

**LC**=Left Cerebral, **LL**=Left Limbic, **RC**=Right Cerebral, **RL**=Right Limbic

| | | | |
|---|---|---|---|
| 1. | LC to RC | Regularity to Irregularity | –.004 |
| 2. | LC to RC | Right Slant $< 5$ to Lower Zone Length $> 5$ | –.032 |
| 3. | LC to RC | Simplification to Lower Zone Length $> 5$ | –.014 |
| 4. | RL to LC | Close tangled lines to Regularity | –.015 |
| 5. | RC to LC | Originality to connectedness | –.004 |
| 6. | RC to LC | Expressive movement to Alignment | –.004 |
| 7. | LC to LL | Simplification to Slowness | –.031 |
| 8. | LC to RC | Alignment to Close, dense lines | –.006 |
| 9. | LL to RC | Alignment to Expressive movement | –.004 |
| 10. | LC to RC | Sharpness to Pressure $> 5$ | –.008 |

Negative correlation variable # 1: Regularity (left cerebral) to Irregularity (right cerebral) are bi–polar Psychogram indicators. Regularity is in the Control dimension and Irregularity is in the Emotional Release dimension. This is a measure of clarity and controlled thinking (contracted left brain thinking) versus the need to experience and express, i.e., release, emotions that produces emotional influenced behavior (released right brain behavior). When one score is high, the other is low.

Negative correlation variable # 2: LC Right Slant < 5 variable (emotionally contracting) has a –.032 negative correlation to RC Lower Zone > 5 variable. This is another direct thinking versus emotional drive factor. Both of these factors are Psychogram indicators.

**Variable # 3**: Simplification (LC) has a –.014 correlation to Lower Zone Length (RC) > 5. This is another direct thinking (conscious need for streamlined mental efficiency) versus the driving unconscious need for activity which underscores emotional drive.

**Variable # 4:** RC variable of Close tangled lines, a subjective thinking influence, has a –.015 correlation to Regularity (LC), a major factor of mental control and objective thinking.

**Variable # 5:** Originality (RC) which supports strength of individualistic thinking and behavior has a –.004 negative correlation to Connectedness (LC), which measures the need for associating concepts in logical thinking.

After the Principle Component Analysis was completed, quadrant scores were totalled for input to the factor analysis. (Factor analysis is a multivariate statistical method commonly used in both internal and external construct validation studies. Interpretation of the results indicated that handwriting can separate and identify cerebral (conscious) factors from limbic (emotional–unconscious) factors for brain dominance.

Zuckerman (1991, pg. 143) indicates that nearly 100 years ago Freud identified the primary and secondary thinking processes which he renamed the unconscious and conscious. In describing the processes, Zuckerman stated, "The primary process is more immediately reflective of basic emotions. We might equate the secondary process with left–brain function and primary process with right–brain functioning and therefore expect to find more emotionality more directly expressed in right–hemisphere function." This can be directly tied to regularity, as an indication of control, versus irregularity, as an indication of emotion, of the movement pattern. This is reflected by the negative correlation #1 from Chart #2.

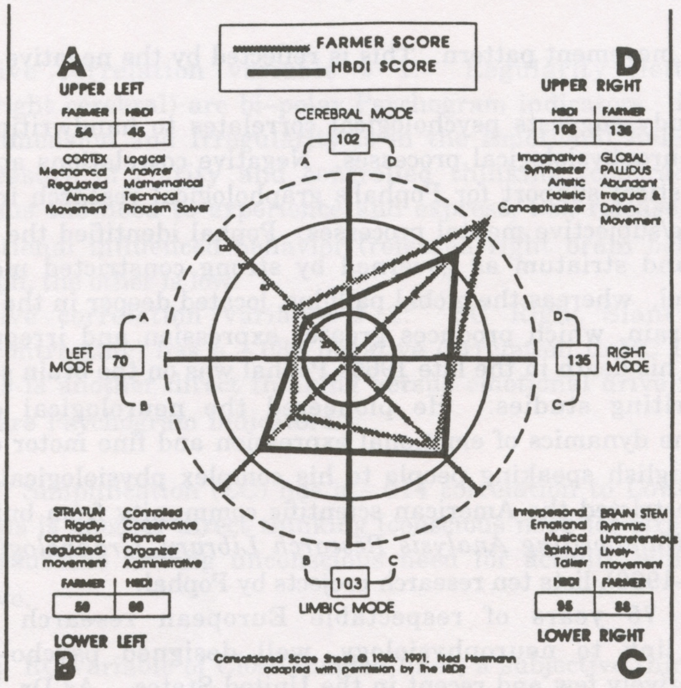
This study suggests psychological correlates to handwriting factors are grounded in neurophysiological processes. Negative correlations attained in this study are statistical support for Pophal's graphological research in defining the brain's objective/subjective mental processes. Pophal identified the motor centers of the cortex and striatum as governed by strong constricted motor influence related to control, whereas the global pallidus, located deeper in the limbic system or emotional brain, which produces greater expression and irregularity in the movement. At his death in the late 1960s Pophal was on the brain science frontier in his handwriting studies. He pioneered the neurological connection of movement to the dynamics of emotional expression and fine motor control. Lack of access by English speaking people to his complex physiological/graphological research has restricted the American scientific community from building on that research. The *Handwriting Analysis Research Library, Graphological Abstracts, Volume I* (1927–1966), lists ten research projects by Pophal.

Despite 75 years of respectable European research grounded in handwriting's link to neurophysiology, well designed psycho–physiological studies are relatively few and recent in the United States. As Dr. Bernard Nevo stated in *The Scientific Aspects of Graphology:*

> Scientific handwriting psychology today is a neglected area; it was banished to the far corner of the academic arena many years ago, and has remained there. It is typical that not a single comprehensive textbook on handwriting behavior research has been published until now. (1986, vii)

Brain science research has defined the basic pattern of the neural firings as an inhibitory or excitatory basis that generates brain wave activity. Richard Restak, M.D., in *The Mind,* indicates, "A neurotransmitter exerts either an excitatory effort on the target neuron, causing it to fire, or an inhibitory effect, preventing it from firing" (Restak, p.40). Since handwriting offers a *uncontaminated, unfiltered* perspective on thinking, personality and behavior, to continue to ignore the potential of such a potent resource as technical graphology is inconceivable. As a sophisticated "on line" product, mediated by neurological processes, it is a sensitive seismograph of a working brain – a visible and measurable mind/body connection. Delivering a "snapshot" of the "anatomy of the unconscious" at the time of writing, it has the capacity to define the three facilities of the human mind:

- its cognitive, or thinking (governing action)
- its affective, or feeling (emotion)
- its conative, or intention to act (action)

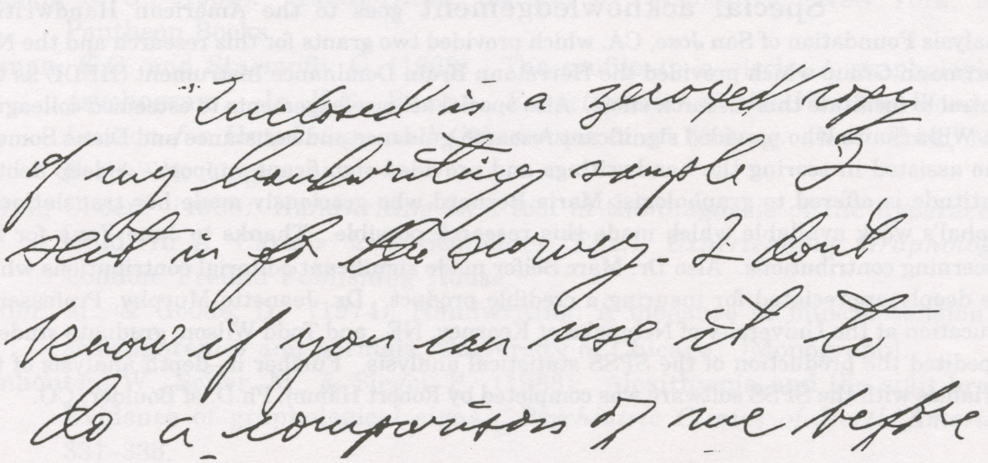


Consolidated Score Sheet © 1986, 1991, Ned Herrmann adapted with permission by the IBDR

**Figure 17: Curtis, 62, CEO, superimposed HBDI and handwriting profile.**

Its ability to unobtrusively track the emotional dynamics on a longitudinal basis is unique for verifying and evaluating therapeutic change and in monitoring drug studies with cost effectiveness. With the medical need to identify and measure the impact of emotional dynamics on health, brain science and neuropsychology should link forces and conduct neurographological research to elevate a greater scientific understanding of personality through this uncommon perspective.

Although the Myers–Briggs Psychological Type Instrument was not used as a measure on this research, in view of the HBDI's strong correlation to the Myers–Briggs, the descriptions of the Jungian functions of Thinking, Sensing, Intuiting and Feeling cognitive styles can also correlate easily with the topologies used in developing the graphological profile. In fact, these factors were used as a general guide in assembling the variables of the handwriting profile quadrants. Interestingly, Pophal identified the typology of his "brainstem" writer (the right limbic in this research) as "altruistic, with a love of fellow man", remarkably similar to the Myers–Briggs Feeling type.



Enclosed is a zeroxed copy
of my handwriting sample I
sent in for the survey. I don't
know if you can use it to
do a comparison of me before

**Figure 18. Curtis's handwriting is a classic example of emotional drive characterized by Pophal's "global pallidus" factors, a major motor center in the limbic area of the brain. Its strongly right slanted, irregular driven movement portrays the dynamic intensity of his emotional responsiveness and emotional sensitivity. Dynamically alive and vibrant, his behavior is motivated by the need to connect emotionally with people and the world outside himself. The irregular movement indicates an emotional sensitivity that also carries an innate sense of intuitive thinking and empathy. The HBDI C quadrant carries spiritual concerns as one of its major factors. Post research feedback from a person who knew him well indicated his empathy, spiritual orientation and humanitarian concerns were a source of emotional trauma for him in the necessary personnel downsizing of his business. The drooping baselines indicate his fatigue and/or depression. However, dominance is never a single quadrant issue and the strongly connected writing indicates strong left cerebral logical thinking.**

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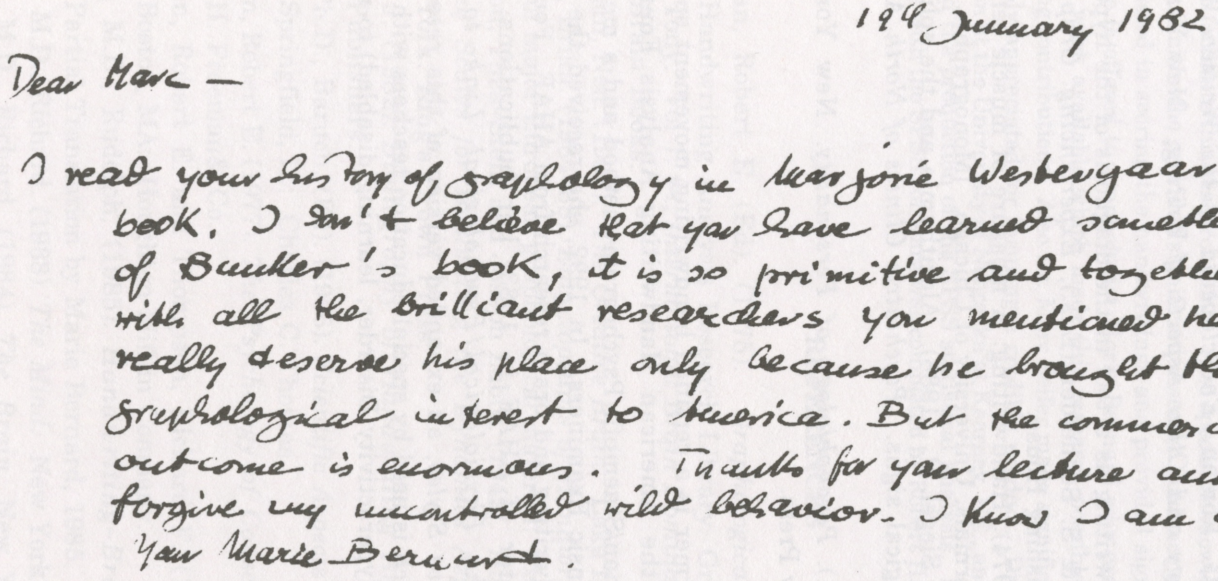
**BIOGRAPHY:** Jeanette Farmer is a certified handwriting movement specialist. She is board certified by the American Handwriting Analysis Foundation (AHAF), certified in the Roman/Staempfli Psychogram method and a member of the American Board of Forensic Examiners. In 1992, she received the Special Achievement Award for handwriting and brain research from AHAF. Founder of the Rocky Mountain Chapter of AHAF in 1983, her publications include *Handwriting Movement:The Physiological/Psychological Link to Brain Dominance and the Cognitive Styles*, an expanded version of this research. A program based on this research is used by special education teachers with at–risk students (Attention Deficit/Hyperactivity Disorder, learning disabled) to regulate impulsive behaviors.



19th January 1982

Dear Marc —

I read your history of graphology in Marjorie Westergaard's book. I don't believe that you have learned something of Bunker's book, it is so primitive and together with all the brilliant researchers you mentioned he really deserve his place only because he brought the graphological interest to America. But the commercial outcome is enormous. Thanks for your lecture and forgive my uncontrolled wild behavior. I know I am awful

Your Marie Bernard.

Marie Bernard was known for her provocative lectures on sexual deviance. Highly melodramatic, sometimes she got carried away with herself. Note her pastose writing, large lefttending oral hooks and also great variation in the lowerzone (e.g., separated y in "graphology" line 1; foreshortened p in "graphological" line 6). The odd indentation on the left margin refers to her ability to establish her own parameters. A bold extravert, Marie always had the ability to obtain handwriting samples of many key world leaders. The world will miss Marie Bernard.